transistors constructed by a silicon semiconductor thin film having crystallinity; and

a peripheral driver circuit, having a second plurality of thin film transistors each including an active region, for driving the first plurality of thin film transistors,

wherein a metal element is included at concentration not higher than 5×10^{19} cm^{-3} in the active region of at least one of only the second plurality of thin film transistors, and the active region of at least one of the second plurality of thin film transistor has mono-domain structure; and

wherein the silicon semiconductor thin film includes a point defect of 1×10^{16} cm^{-3} or more, and one of hydrogen and halogen element for neutralizing the point defect at a concentration of 1×10^{15} to 1×10^{20} cm^{-3}.

a e

REMARKS

The present invention is characterized by a monodomain TFT which comprises a channel region or an active layer formed in a monodomain region.

In the specification, a monodomain region is defined as a region having no grain boundary and thus it can be regarded as one domain (a monodomain). A TFT utilizing such a region which can be regarded as a single crystal region is referred to as a monodomain TFT. (page 7 line 29-32)

A monodomain region as disclosed in this invention can be effectively formed by performing laser irradiation while heating, for example. In this case, the sample (the surface on which the monodomain region is formed) should be irradiated by laser light with 450 to 750°C, preferably, 500 to 600°C. Other types of intense light such as infrared light may be used instead of laser

light. (page 7 line 11-18).

It has been determined that in the method of providing a crystalline silicon film by crystallizing an amorphous silicon film using laser irradiation, a domain of a greater grain size (monodomain region) can be obtained by heating the sample at 450°C or more during laser irradiation. The monodomain region has a crystal structure which can be regarded as a single crystal. (page 10 line 29-35)

However, the difference between single crystal and monodomain may be explained as follows. There is no grain boundary in the monodomain region. Unlike a single crystal silicon, it has point defects to be neutralized therein. It includes hydrogen or halogen elements for neutralizing the point defects at a concentration of 1×10^{15} to 1×10^{20} cm^{-3}. (Page 10 line 36 - page 11 line 4)

The present invention applies monodomain to a thin film transistor (TFT). The channel forming region is formed as a monodomain region and no grain boundary exists in at least the channel forming region to provide a TFT having excellent characteristics. This is because such a configuration eliminates carrier scattering and the fluctuation and deterioration of characteristics due to the presence of grain boundaries. It is preferable to form the whole active layer including the source and drain regions as a monodomain region. (page 6 line 22-28)

The present invention is to provide a TFT which is not adversely affected by the grain boundaries, has a high withstand voltage, is capable of handling a high current, and has characteristics which are subjected to less deterioration and fluctuation and similar to those utilizing a single crystal semiconductor. (page 4 line 21-26)

By using a region of a thin film silicon semiconductor that can be regarded as a single crystal region as an active layer, a TFT having a high withstand voltage, less fluctuation and deterioration of characteristics can be obtained. (page 9 line 27-31)

In view of the above discussion, the specific feature of monodomain in the present invention has been further clarified. New claims 39-43 have been added to complete the scope of applicants' protection.

Examination on the merits is requested.

Respectfully submitted,

Gerald J. Ferguson, Jr.
Registration No. 23,016

Sixbey, Friedman, Leedom & Ferguson, P.C.
2010 Corporate Ridge, Suite 600
McLean, Virginia 22102
(703) 790-9110